Docket No.: 21-006 **_PATENT_**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Clifford Brown, et al.	:	Confirmation No.:	3876
Serial No.:	09/722,168	:	Art Unit:	2638
Filed:	11/22/2000	:	Examiner:	Kevin Y. Kim
For:	SYSTEM AND METHOD FOR AUTOMATIC DIAGNOSIS OF IMPAIRMENTS IN A DIGITAL QUADRATURE AMPLITUDE MODULATED SIGNAL	:		

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RESPONSE/AMENDMENT

UNDER 37 C.F.R. §1.111

Sir:

The following Amendment and Remarks are submitted under 37 C.F.R. §1.111 in response to the Office Action mailed January 10, 2006, following the amendment format set forth under 37 CFR §1.121. After this introductory section, there are Amendments to the Claims and then Remarks, each starting on a separate page.

Amendments to the Claims consist of deletion of claims 15, 63, 81, and 85, and amendments for claims 17-19, 83, and 84, which are incorporated in a complete listing of the claims.

AMENDMENTS TO CLAIMS

- Please delete claims 15, 63, 81, and 85.
- Please amend pending claims 17-19, 83, and 84 as indicated below. A complete listing of all claims and their status in the application are as follows:

1. (previously presented) A device for detecting impairments in a digital quadrature amplitude modulated signal comprising:

    a phase noise detector comprising;

    a sorter;

    a rotator coupled to the sorter; and

    a comparator coupled to the rotator;

    a compression detector;

    an interference detector; and

    a constellation storage coupled to the phase noise detector, the compression detector, and the interference detector.

2. (canceled)

3. (previously presented) The device of Claim 1 wherein the rotator rotates a vector utilizing a method comprising the steps of:

    converting the vector's end point coordinates into polar coordinates;

    adjusting the angle coordinate; and

    reconverting the end point coordinates to Cartesian coordinates.

4. (previously presented) The device of Claim 1 wherein the rotator rotates a vector utilizing the matrix:

$$\begin{vmatrix} \cos\Theta & \sin\Theta \\ -\sin\Theta & \cos\Theta \end{vmatrix}$$

5. (previously presented)The device of Claim 1 wherein the comparator evaluates the inequality:

$$\sigma_x >= C\sigma_y$$

6. (original) The device of Claim 5 wherein $C = 1.5$.

7. (original) The device of Claim 1 wherein the compression detector comprises:

a sorter; and

an X/Y deviation determinator coupled to the sorter.

8. (original) The device of Claim 1:

wherein the phase noise detector comprises:

a rotator; and

a comparator coupled to the rotator;

wherein the compression detector comprises an X/Y deviation determinator; and

wherein the phase noise detector and compression detector share a sorter coupled to the rotator and to the X/Y deviation determinator.

9. (original) The device of Claim 7 wherein the X/Y deviation determinator evaluates the inequality:

$$Z_{avg} <= CZ_{exp}$$

10. (original) The device of Claim 9 wherein $C = 0.98$.

11. (original) The device of Claim 7 wherein the X/Y deviation determinator analyzes a top row of cells of a constellation.

12. (original) The device of Claim 11 wherein the X/Y deviation determinator evaluates the inequalities:

$$Y_{avg}[b_4] < Y_{avg}[b_3] < Y_{avg}[b_2] < Y_{avg}[b_1]$$

and

$$Y_{avg}[b_{-4}] < Y_{avg}[b_{-3}] < Y_{avg}[b_{-2}] < Y_{avg}[b_{-1}]$$

13. (original) The device of Claim 7 wherein the X/Y deviation determinator analyzes a column of cells of a constellation.

14. (original) The device of Claim 1 wherein the interference detector comprises:

a sorter;

an error calculator coupled to the sorter;

a distribution chart coupled to the error calculator; and

a data peak detector coupled to the distribution chart.

Claims 15-16 (canceled)

17. (currently amended) A device for detecting impairments in a digital quadrature amplitude modulated signal comprising a phase noise detector, wherein the phase noise detector comprises:

a sorter;

a rotator coupled to the sorter~~The device of Claim 15~~ wherein the rotator rotates a vector by utilizing a method comprising the steps of:

converting the end point coordinates into polar coordinates;

adjusting the angle coordinate; and

reconverting the end point coordinates to Cartesian ~~coordinates.~~coordinates; and

a comparator coupled to the rotator

18. (currently amended) A device for detecting impairments in a digital quadrature amplitude modulated signal comprising a phase noise detector, wherein the phase noise detector comprises:

a sorter;

a rotator coupled to the sorter; and

a comparator coupled to the rotator~~The device of Claim 15~~ wherein the rotator rotates a vector utilizing the matrix:

$$\begin{vmatrix} \cos\Theta & \sin\Theta \\ -\sin\Theta & \cos\Theta \end{vmatrix}$$

19. (currently amended) A device for detecting impairments in a digital quadrature amplitude modulated signal comprising a phase noise detector: ~~The device of Claim 15 wherein:~~

wherein the phase noise detector comprises:

a rotator; and

a comparator coupled to the rotator;

wherein the compression detector comprises an X/Y deviation determinator;

wherein the interference detector comprises:

an error calculator;

a distribution chart;

a data peak detector; and

wherein the phase noise detector, compression detector, and interference detector share a sorter coupled to the rotator, to the X/Y deviation determinator, and to the error calculator.

Claims 20-28. (canceled)

29. (previously presented) A device for detecting impairments in a digital quadrature amplitude modulated signal comprising an interference detector wherein the interference detector comprises:

a sorter;

an error calculator coupled to the sorter;

a distribution chart coupled to the error calculator; and

a data peak detector coupled to the distribution chart.

Claims 30-32. (canceled)

33. (original) A method for detecting compression in a digital quadrature amplitude modulated signal, the method comprising the steps of:

sorting the symbols of the digital quadrature amplitude modulated signal into a constellation;

selecting a sub-group of data points from the constellation;

determining the magnitude of the vectors from the origin of the constellation to each datum point of the sub-group;

determining the magnitude of a vector from the origin to an ideal point associated with the sub-group;

comparing the magnitude of the vectors from the origin of the constellation to each datum point to the magnitude of the vector from the origin to the ideal point associated with the sub-group;

determining from the comparison if compression is present; and

generating a signal indicating compression in the digital quadrature amplitude modulated signal if the determining step indicates compression is present.

34. (original) The method of Claim 33 wherein the sub-group is a cell of the constellation.

35. (original) The method of Claim 33 wherein the sub-group is a cell in a corner of the constellation.

36. (original) The method of Claim 33 further comprising the step of averaging the magnitudes of the vectors from the origin of the constellation to each datum point of the sub-group.

37. (original) The method of Claim 34 further comprising the step of averaging the magnitudes of the vectors from the origin of the constellation to each datum point of the sub-group.

38. (original) The method of Claim 35 further comprising the step of averaging the magnitudes of the vectors from the origin of the constellation to each datum point of the sub-group.

39. (original) The method of Claim 36 wherein the comparing step evaluates the inequality:

$$Z_{avg} <= CZ_{exp}$$

40. (original) The method of Claim 39 wherein $C = 0.98$.

41. (original) A method for detecting compression in a digital quadrature amplitude modulated signal, the method comprising the steps of:

sorting the symbols of the digital quadrature amplitude modulated signal into a constellation;

selecting more than one sub-group of data points from the constellation;

analyzing each datum point according to its selected sub-group;

comparing the analyzed data points for each sub-group to the analyzed data points of every other selected sub-group;

determining from the comparison if compression is present; and

generating a signal indicating compression in the digital quadrature amplitude modulated signal if the determining step indicates compression is present.

42. (original) The method of Claim 41 wherein the selecting step selects more than one cell of the constellation.

43. (original) The method of Claim 41 wherein the analyzing step averages a coordinate of each datum point according to its sub-group.

44. (original) The method of Claim 43 wherein the averaging is according to each selected cell of the constellation.

45. (original) The method of Claim 42 wherein the selected cells constitute a row of the constellation.

46. (original) The method of Claim 45 wherein the selected cells constitute the top row of the constellation.

47. (original) The method of Claim 45 wherein the selected cells constitute the bottom row of the constellation.

48. (original) The method of Claim 45 wherein the selected cells constitute a column of the constellation.

49. (original) The method of Claim 45 wherein the comparing step evaluates the inequalities:

$$Y_{avg}[b_4] < Y_{avg}[b_3] < Y_{avg}[b_2] < Y_{avg}[b_1]$$

and

$$Y_{avg}[b_{-4}] < Y_{avg}[b_{-3}] < Y_{avg}[b_{-2}] < Y_{avg}[b_{-1}]$$

50. (original) A method for detecting non-coherent interference in a digital quadrature amplitude modulated signal, the method comprising the steps of:

sorting the symbols of the digital quadrature amplitude modulated signal into a constellation;

detecting an error signal for one or more data points of the constellation;

arranging the detected error signals;

detecting non-coherent interference from the arranged, detected error signals; and

generating a signal indicating non-coherent interference in the digital quadrature amplitude modulated signal if the detecting step indicates compression is present.

51. (original) The method of Claim 50 wherein:

the sorting step includes sorting data points into cells of the constellation; and

the detecting an error signal step includes determining the Euclidian distance between a datum point and the ideal point associated with the datum point's cell.

52. (original) The method of Claim 51 wherein the arranging step includes constructing a histogram according to the error signals detected in the detecting step.

53. (original) The method of Claim 52 wherein the step of detecting non-coherent interference from the arranged, detected error signals includes detecting one or more peaks in the histogram that are indicative of non-coherent interference.

54. (previously presented) A device for detecting impairments in a digital quadrature amplitude modulated signal comprising:

means for detecting phase noise comprising;

means for sorting one or more digital quadrature amplitude modulated signal symbols;

means for rotating data points such rotating means coupled to the sorting means; and

means for comparing rotated data points such comparing means coupled to the rotating means.

means for detecting compression;

means for detecting interference; and

means for storing a constellation storage such storage means coupled to the phase noise detection means, the compression detection means, and the interference detection means.

55. (canceled)

56. (previously presented) The device of Claim 54 wherein the comparator means evaluates the inequality:

$$\sigma_x >= C\sigma_y$$

57. (original) The device of Claim 56 wherein $C = 1.5$.

58. (original) The device of Claim 54 wherein the compression detection means comprises:

means for sorting one or more digital quadrature amplitude modulated signal symbols; and

means for determining X/Y deviations such means coupled to the sorting means.

59. (original) The device of Claim 58 wherein the X/Y deviation determining means evaluates the inequality:

$$Z_{avg} <= CZ_{exp}$$

60. (original) The device of Claim 59 wherein $C = 0.98$.

61. (original) The device of Claim 58 wherein the X/Y deviation determining means analyzes a top row of cells of a constellation and evaluates the inequalities:

$$Y_{avg}[b_4] < Y_{avg}[b_3] < Y_{avg}[b_2] < Y_{avg}[b_1]$$

and

$$Y_{avg}[b_{-4}] < Y_{avg}[b_{-3}] < Y_{avg}[b_{-2}] < Y_{avg}[b_{-1}]$$

62. (original) The device of Claim 54 wherein the interference detector comprises:

means for sorting one or more digital quadrature amplitude modulated signal symbols;

means for detecting an error signal coupled to the sorting means;

a distribution chart coupled to the error detection means; and

means for detecting peaks coupled to the distribution chart.

Claims 63-69. (canceled)

70. (previously presented) A device for detecting impairments in a digital quadrature amplitude modulated signal comprising means for detecting interference wherein the interference detection means comprises:

means for sorting one or more digital quadrature amplitude modulated signal symbols;

means for detecting an error signal coupled to the sorting means;

a distribution chart coupled to the error detection means; and

means for detecting peaks coupled to the distribution chart.

Claims 71-72. (canceled)

73. (original) A device for detecting compression in a digital quadrature amplitude modulated signal comprising:

means for sorting the symbols of the digital quadrature amplitude modulated signal into a constellation;

means for selecting a sub-group of data points from the constellation;

means for determining the magnitude of the vectors from the origin of the constellation to each datum point of the sub-group;

means for determining the magnitude of a vector from the origin to an ideal point associated with the sub-group;

means for comparing the magnitude of the vectors from the origin of the constellation to each datum point to the magnitude of the vector from the origin to the ideal point associated with the sub-group;

means for determining from the comparison if compression is present; and

means for generating a signal indicating compression in the digital quadrature amplitude modulated signal if the determining means indicates compression is present.

74. (original) The device of Claim 73 further comprising means for averaging the magnitudes of the vectors from the origin of the constellation to each datum point of the sub-group.

75. (original) The device of Claim 74 wherein the comparing means evaluates the inequality:

$$Z_{avg} <= CZ_{exp}$$

76. (original) A device for detecting compression in a digital quadrature amplitude modulated signal comprising:

means for sorting the symbols of the digital quadrature amplitude modulated signal into a constellation;

means for selecting more than one sub-group of data points from the constellation;

means for analyzing each datum point according to its selected sub-group;

means for comparing the analyzed data points for each sub-group to the analyzed data points of every other selected sub-group;

means for determining from the comparison if compression is present; and

means for generating a signal indicating compression in the digital quadrature amplitude modulated signal if the determining means indicates compression is present.

77. (original) The device of Claim 76 wherein the analyzing means averages a coordinate of each datum point according to its sub-group.

78. (original) The device of Claim 77 wherein the comparing means evaluates the inequalities:

$$Y_{avg}[b_4] < Y_{avg}[b_3] < Y_{avg}[b_2] < Y_{avg}[b_1]$$

and

$$Y_{avg}[b_{-4}] < Y_{avg}[b_{-3}] < Y_{avg}[b_{-2}] < Y_{avg}[b_{-1}]$$

79. (original) A device for detecting non-coherent interference in a digital quadrature amplitude modulated signal comprising:

means for sorting the symbols of the digital quadrature amplitude modulated signal into a constellation;

means for detecting an error signal for at least one datum point of the constellation;

means for arranging the detected error signals;

means for detecting non-coherent interference from the arranged, detected error signals; and

means for generating a signal indicating non-coherent interference in the digital quadrature amplitude modulated signal if the detection means indicates compression is present.

80. (previously presented) The device of Claim 79 wherein:

the sorting means includes means for sorting data points into cells of the constellation; and

the detection means includes means for determining the Euclidian distance between a datum point and the ideal point associated with the datum point's cell.

Claims 81-82 (canceled)

83. (currently amended) A memory device for storing program instruction steps comprising:

a phase noise detector comprising;

a sorter;

a rotator; and

a comparator;

a compression detector wherein the compression detector comprises:

a sorter; and

an X/Y deviation determinator; and

an interference detector.~~The memory device of Claim 81 wherein the compression detector comprises:~~

~~a sorter; and~~

~~an X/Y deviation determinator.~~

84. (currently amended) A memory device for storing program instruction steps comprising:

a phase noise detector comprising;

a sorter;

a rotator; and

a comparator;

a compression detector; and

an interference detector~~The memory device of Claim 81~~ wherein the interference detector comprises:

a sorter;

an error calculator;

a distribution chart; and

a data peak detector.

Claims 85-89. (canceled)

90. (previously presented) A memory device for storing program instruction steps comprising an interference detector wherein the interference detector comprises:

a sorter;

an error calculator;

a distribution chart; and

a data peak detector.

91. (canceled)

REMARKS

Allowable Subject Matter

The Examiner stated that claims 1, 3-14, 29, 33-54, 56-62, 70, 73-80, and 90 are allowed.

The Examiner stated further that claims 17-19, 83, and 84 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 17-19 have been rewritten to include all the limitations of the base claim 15 and claims 83 and 84 have been rewritten to include all the limitations of the base claim 81. Claims 15 and 81 have been canceled.

Claim Rejections - 35 USC §102

Claims 15 and 63 are rejected under 35 U.S.C. §102(b) as being anticipated by Kim et al. (U.S. Patent No. 5,602,601, hereinafter "Kim").

Regarding claims 15 and 63, these claims have been canceled.

Claim Rejections - 35 USC §103

Claim 81 is rejected under 35 U.S.C. §103(a) as being unpatentable over Kim et al. (U.S. Patent No. 5,602,601, hereinafter "Kim") in view of Pottinger et al. (U.S. Patent No. 4,918,708, hereinafter "Pottinger") and Gatherer (U.S. Patent No. 6,560,294, hereinafter "Gatherer").

Regarding claim 81, this claim has been canceled.

Claim 85 is rejected under 35 U.S.C. §103(a) as being unpatentable over Kim et al. (U.S. Patent No. 5,602,601, hereinafter "Kim") in view of Gatherer (U.S. Patent No. 6,560,294, hereinafter "Gatherer").

Regarding claim 85, this claim has been canceled.

Conclusion

In view of the above, it is submitted that the claims are in condition for allowance and reconsideration of the rejections is respectfully requested. Allowance of claims 1, 3-14, 17-19, 29, 33-54, 56-62, 70, 73-80, 83-84, and 90 at an early date is solicited.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including any extension of time fees, to Deposit Account No. 50-0374 and please credit any excess fees to such deposit account.

Respectfully submitted,

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